WESTERN UPDATE #66

THE WESTERN NEWSLETTER FOR MF, LF, AND VLF EXPERIMENTERS

Available for business-size 25 cent SASE's, plus 60 cents per issue (or $7 per year)
from: Jim Ericson, 226 Charles St., Sunnyvale, CA 94086-6063

ACTIVE WESTERN BEACON STATUS (LIST COMPILED JULY 16, 1989)

FREQ(kHz)	IDENT	QTH	SKED INFO
162.00	T (dashes)	Sunnyvale, CA	24h/7d. A2 modulation 80% (+/-760 Hz)
163.80	FPV	Granada Hills, CA	Weekends. See alt. freq. 182.62 kHz.
163.88	M	San Diego CA	Intermittent
166.503	C	near Morro Bay, CA	24h/7d.
169.96	NRE	San Diego, CA	24h/7d
175.225	MAX	Wheatland, WY	24h/7d CW. BPSK/ASCII by request.
175.703	FAW	Orem, UT	24h/7d.
176.26	CO	Glenwood Springs, CO	24h/7d
176.75	SR	Elgin, OR	Off for awhile
176.85	7FS	Belfair, WA	24h/7d.
179.0	MPM	Salt Lake City, UT	24h/7d. ASCII/CW alternating 5minutes.
179.54	WJ	Arleta, CA	Intermittent.
180.224	F	Los Banos, CA	FSK. By request.
180.80	XU	Sioux Falls, SD	24h/7d. BPSK/CW alternating 5 minutes.
181.17	IZJ	San Gabriel, CA	Daily. Silent 0700 to 1100 UTC.
181.288	MEL	San Jose, CA	24h/7d.
181.71	TLX	San Rafael, CA	By request.
182.62	FPV	Granada Hills, CA	Weekends See alt. freq. 163.80 kHz.
182.672	G	Palo Alto, CA	24h/7d.
182.88	H, H2	Descanso, CA	24h/7d. Alt. Freq = 166.90 kHz.
183.160	PRK	Saratoga, CA	24h/7d
183.63	PLI	Burbank, CA	Unknown.
184.016	EK	Sunnyvale, CA	24h/7d.
184.32	N3S	Mocksville, NC	Intermittent tests.
184.383	TI	Kingman, AZ	24h/7d.
184.39	HO	Pahoa, HI	By request.
184.43	V	Forestville, CA	24h/7d.
184.46	B	Fresno, CA	24h/7d.
184.80	T (dashes)	Mountain View, CA	Intermittent.
185.0	ZYK	Redway, CA	24h/7d.
185.00	AU	Champaign, IL	0100 to 0600 UTC, 7 days.
185.49	AZ	Tucson, AZ	24h/7d. Alt. Freq. = 187.77 kHz.
186.80	BA	Lancaster, IL	24h/7d.
187.0	ELU	Simi Valley, CA	24h Saturday and Sunday on SSB.
187.252	TEXAS	NW of Ft. Worth, TX	24h/7d.
187.30	UPN	Cincinatti, OH	Occasional.
187.50	DCH	Berlin, MD	Off until September.
187.59	SM	San Jose, CA	24h/7d.
189.84	R	Nevada Test Site	Not recently heard. Status unknown.
190.4	OHH	Richmond Hill, Canada	Occasional testing.
525.+/-.76	T (dashes)	Sunnyvale, CA	A2 mod 24h/7d. Simulcast with T at 162.00
1624.75	CT	Pleasant Gap, PA	24h/7d.
1631.54	A	Cleveland, NC	24h/7d. New beacon!
1637.93	SS	San Rafael, CA	10 PM to 7 AM. Note slight QSY.
1650.67	TI	Kingman, AZ	24h/7d.
1655.5	CO	Glenwood Springs, CO	24h/7d.
1658.062	Z2	9 mi. NW of San Simeon, CA	Temporarily off.
1661.35	U	San Diego, CA	Nites only.
1687.28	D	Descanso, CA	6PM to 6AM daily Frank Cathell

LOTS MORE SASES ON FILE

Non-Western listings are beacons currently being copied in the West, or they have SASE's on file with us

EK NOTES:

It's been almost two months since the last issue of **WU**. I'm not pushing to achieve monthly publication, but rather I plan to publish when there is enough material to make it worthwhile.

I took over as editor of **Western Update** with issue #33 in July, 1986, and over the past three years I've had a lot of fun putting this thing together, talking with many of you on the radio (and the telephone), and occasionally making a technical contribution of my own.

As a group, your interests in the hobby are changing (and that's good!). We will try to adapt this publication to follow those changes. Three years ago, interest was primarily 160 to 190 kHz operation. Experimental interest has since spread to MedFER (broadcast-band) beacons, Whistlers, Solar Flare Monitoring, and now HiFER beacon operation (see article in this issue). Readership has increased from forty (three years ago) to 122 this month. I'll be happy to continue generating the Western Update, but remember, without your technical inputs and articles it will eventually die.

RESOURCES AND REMINDERS:

Experimenter's amateur radio nets continue: Sunday mornings in California/Arizona at about 7:30 A.M. on 3927 kHz LSB. Same frequency at about 8:00 P.M. on Thursday evenings. Some Thursday nights there is also 160 M action around 9:00 P.M. on 1987.5 kHz LSB. All nets are informal, so feel free to break in!

Ken Cornell has just announced the new 6th edition of his Low and Medium Frequency Radio Scrapbook. If you already own the 5th edition, you might not be able to justify the $16.95 price (although the new edition has lots of new stuff, including a section on solar flare monitoring). If you don't have a copy of the 5th, you really ought to order the new version. Postpaid in the USA from **Ken Cornell (W2IMB), 225 Baltimore Avenue, Point Pleasant Beach, NJ 08742.**

You cannot be serious about this hobby and not subscribe to THE LOWDOWN, a publication of the Longwave Club of America. This monthly publication covers experimental work below 550 kHz, and is available for $12 per year from **LWCA, c/o William Oliver, 45 Wildflower Road, Levittown, PA 19057.**

The counterpart of Western Update for midwest, eastern, and Canadian experimenters is the **Northern Observer**, published approximately monthly by Herb Balfour, 91 Elgin Mills Road West, Richmond Hill, Ontario, Canada, L4C4M1. The price is $12 a year, plus 12 self-addressed (no stamps) business-size envelopes.

Two good sources for LowFER converters, antenna preamplifiers, and transmitters (write for free catalogues): **LF Engineering Co., Inc., 17 Jeffry Road, East Haven, CT 06512.** Also, highly recommended is **Burhans Electronics, 161 Grosvenor Street, Athens, OH, 45701.**

A MODULAR APPROACH TO RECEIVER CONSTRUCTION

PART II- MOTIVATIONS AND METHODS

by

Michael Mideke

In setting out to create a receiver, it is important to be realistic about one's objectives and resources. If your heart's desire is a digital whizz-bang radio with 75 memories, 180 dB of dynamic range and coverage from DC to light; you will probably save yourself grief (and money too) by going out and buying a commercial product. Of course if you are drawn to solving the problems presented by such a project, by all means go to it! But unless your experience in design and construction includes that kind of problem solving the task is likely to prove very heavy going.

On the other hand, if you are tired of tying up an all-band transceiver to monitor one or two VLF channels for SIDs, it makes excellent sense to build a dedicated receiver. There are several approaches which produce results at least equal to those obtained with the big rig. They will consume less electricity too. One could try a couple of different designs or branch out to other single-channel receiver projects such as a WWVB receiver or one dedicated to a particular Lowfer signal.

Tunable receivers with limited coverage and/or a limited selection of modes are somewhat more demanding projects, but they are still well within reach of anyone equipped with a bit of patience and an understanding of the most basic fundamentals of electronics.

It is certainly true that the more a person knows about electronic design and construction the more efficiently he can work and the more likely he is to come up with an end product that closely matches his original objectives. But it is also true that EVERYONE starts from scratch at some point. Everyone's achievements come out of their accumulated experience- and generally that experience includes quite a lot of time with a smoking soldering iron and circuits that either don't work or don't work right. Since this is our hobby, we are wonderfully free to make mistakes, to screw up or simply to be frivolous. After all, we are in the activity for fun and for the fun of finding out just where we can go from wherever it is that we happen to be setting out.

If building a receiver seems like a bit too much to tackle all at once, why not start with some useful accessories for an existing receiver. For instance: A tuned preamp/preselector. A tunable reference oscillator. An audio filter.

Simple circuits that will fulfill these functions can be found in Ken Cornell's SCRAPBOOK, **THE LOWDOWN**, the LF newsletters and many other publications. Once these three accessories are at hand, only a product detector need be added to complete a direct-conversion receiver. Or, with slightly different configuration of the detector, we have either a converter or the basis for a superheterodyne receiver. PRESTO: MODULAR RECEIVERS!!

METHODS- It is often useful to extend the modular approach down to the level of "sub sub-assemblies". This is particularly true when working with new, confusing or untried circuits. By breaking the design down into a number of functional blocks, it is possible to simplify things to the point where the list of things that CAN go wrong within any given block is manageably short. This reduces the need for tedious and frustrating debugging of multiple and interactive malfunctions. (Of course this does not guarantee that all the blocks will sing TOGETHER when hooked up together, but at least it is a good start. We CAN be sure the composite will fail if the sub-units don't work!)

At this stage of work it is extremely helpful to have a couple of solderless breadboards on hand, along with a supply of clean components reserved for use with the breadboards. Start by getting the circuit working on the breadboard. If it is to be connected to other circuits that are already completed, try the breadboard unit in conjunction with these circuits. Then take time to tinker with component values and alternative approaches. Things that are easy to try out on the breadboard get complicated and messy in the soldered version. When everything seems OK, stop and draw a fresh schematic detailing exactly what is on the breadboard. Then go ahead with the hard-wired version. If possible, preserve the breadboard until the completed circuit has checked out satisfactorily.

By now it should be apparent that I'm advocating an approach that is quite different from one that would have you trotting down to Radio Shack with a neat little parts list for building exactly one copy of one exactly detailed construction project. This is nice enough when it happens but awfully limiting to be an exclusive choice. So, you need a "junkbox" consisting at the very least of a fair supply of components that are sure to be needed time and again. Little heaps of resistors and capacitors for biasing, bypassing, coupling and filtering. IC sockets. Common transistors and ICs (there are thousands of different semiconductor devices to be had...and there are also thousands of useful and effective circuits that can be built using just a few inexpensive semiconductor building-blocks).

The accumulation of "junk" comes naturally: the more you build the more aware you become of the kinds of things you are using a lot of or about to be needing. It becomes possible to make intelligent use of component bargains when they crop up. It often makes sense to pick up a few "extra" parts when buying for a specific project.

INSTRUMENTS- In addition to basic hand tools, a few instruments are downright essential. A few others can make life so much easier that you wonder: "How did I ever get along without....?"

If we are working with receivers, one of the first essentials is a general coverage receiver. It doesn't have to be a great radio or a modern radio, just so it works. It should cover both the primary frequencies and any intermediate frequencies you expect to be working with. Of course if that frequency coverage is not available, you can always build a converter.

Another essential is a multi-meter capable of reading voltage, current and resistance. If you are starting out with only one meter, make it an old-fashioned analog type with a real meter movement. Digital meters are great, and unsurpassed for some measurements, but often the mechanical meter will tell you more of what you really need to know, more easily than the digital instrument. If your budget allows TWO meters, by all means make the second one digital.

A frequency counter falls high on the list of things that are hard to do without. (Yes, I know great and wonderful things were done in electronics long before ANYONE had frequency counters. I'm sorry for those people. But today, don't be without a counter if you can possibly obtain one!)

A signal generator of some sort is essential. It need not be elaborate, and in fact can be a good construction project in itself.

This is not quite the end of the list, but it IS the end of the page- so, more next month.

NOTES ON RECENT PART 15 FCC RULE REVISIONS
by: John Seamons KF6VO/JKS

I have some interesting news for Part 15 experimenters. On June 23, 1989 the long-awaited revision to Part 15 took effect. Although the rules for LowFER and MedFER operation are unchanged, there are now some new bands available for people to experiment with.

I'm quite pleased to announce the first high frequency (HiFER?) Part 15 beacon, "JKS", operating on 13.560 MHz at a power of 2 milliwatts into a 95 foot dipole antenna. The beacon sends a 90 second CW message with an address for QSL reports. The memory keyer is a little flakey, so copy the message several times to be sure.

Here is a quick summary of the new bands:

from (MHz)	to (MHz)	BW (kHz)	F/Stgth. (uV/M)	eff. pwr. (Watts)	ant. restrictions	notes
13.553	13.670	14	10,000 @ 30M	0.0018	none	(1)
26.960	27.280	320	10,000 @ 3M	0.000018	none	(2)
40.660	40.700	40	1,000 @ 3M	0.000000180	none	
49.820	49.900	80	10,000 @ 3M	000018	none	
49.820	49.900	80	----------	0.1	1 Meter	(3)
902.00	928.00	26,000	50,000@3M	0.000460	none	
902.00	928.00	26,000	---------	1.0	none	(4)

The new rules actually allow operation almost anywhere in the spectrum, but the field strengths are probably too low for communication at reasonable distances.

Note 1: This seems like the most interesting new band. You can run almost 2 milliwatts with no antenna restrictions. the rules specify field strengths in most cases. To translate this into equivalent power delivered to a dipole antenna I used the equation: $P_{watts} = ((E_{volts/m})^2 \times (D_m)^2)/49.2$, where **E** is the field strength measured at the distance **D**. This band is an ISM band (industrial, scientific and medical equipment) and is frequently occupied by the unstable carriers from RF heating machines (used to cure glue in plywood, etc.).

Note 2: The lower section of the CB band. May be interesting if you can find a quiet spot!

Note 3: Although the 1 meter antenna restriction is one-twelfth of a wavelength, 100 mW is a fair amount of power.

Note 4: This band is restricted to spread-spectrum signals. With one watt of power, this band would make an excellent choice for a local high-speed data network. For comparison, most LowFERS (160 to 190 kHz) are probably about 300 uV/m @ 300m because of the short antenna restrictions. This is equivalent to 30,000 uV/m @ 3m if you ignore the near-field effects.

I'll be happy to send a copy of the 32 page revised FCC Part 15 rules to anyone who asks.

TWO-WAY COMMUNICATIONS - THE FUTURE OF 1750

BY Randy Seden (ELU)
1272 Harold Ave.
Simi Valley, Ca. 93065

For the past 11 months, FPV, PLI, and myself have been meeting on 1750 using PACKET (100 BAUD), AMTOR (FEC and ARQ), RTTY, and CW using a computer interface called a "PAKRATT 232" made by Advanced Electronic Applications. PACKET is one of the newest forms of communication which offers error-free text and has some advantages the other modes can't offer. The main feature is the ability to have a beacon with a message to other lowfers suggesting a time for a schedule and they in turn can leave a message on your screen in-between your beacon (the beacon can be sent from every 10 minutes up to 2,500 minutes apart if you want, depending on what you tell the PAKRATT). As far as its use for two-way communications, it's kind of slow as you type up all the info you want to send, and THEN you hit the return key and it transmits your entire message in one long digital burst.

An advantage of PACKET is the ability to use the "digipeater mode" which would act like a repeater from one station to the next (another way to link up lowfers across the states). By far the best method to use under noisy conditions is the AMTOR ARQ mode. AMTOR is an adaptation of the SITOR system used in high-seas ship telex, which uses a unique seven-bit synchronous code for error detection and error correction. FPV and myself have used this mode when SSB was totally out of the question (the character will be sent over and over until a confirmation of its reception is sent to your computer). As far as RTTY and CW, nothing new there, just another digital mode to play with using your computer.

In the not too distant future, Frank Cathell (H2 of Descanso, Ca) and Steve Meyerpeter (U of San Diego) will be building up transverters and will be joining our So. Cal. net on SSB which were excited about. There is also Chuck Roblin (QLF in Santa Monica) who already has a transverter and with his 18' antenna is almost ready to join the roundtable as he perfects his radiating system. This is another point I want to bring up in our making 1750 a practical band- the ability to use a VFO as is necessary for our band with all the doggone powerline carriers that bother some folks more than others. It's so nice when you can say lets QSY up to such and such frequency as our group did this morning. We need to get away from XTAL controlled transmitters (except when you have your beacon grinding away). I forgot to mention that all the digital modes are sent over LSB using our Amatuer transcievers with a transverter. PLI and I are using transverters made by Dave Curry of Curry Communications.

All in all, I think 1750 has come a long way from the early QSO's that Ken Cornell mentions in his scrapbook during the late 60's and there's still more to be had if we work at it. I'm presently working on a SSB transceiver which when finished will be published in this magazine so that those of you who are not amatuers can join in on the fun. There needs to be more improvement in our ability to deal with the noise on the band which will make for longer haul communications. Blankers are great but they are by no means the total answer (perhaps a blanker followed by an adjustable limiter circuit). Will keep you posted on further developments as they happen.

MAILBAG:

Keith Olson (7FS) writes from Washington about recent antenna improvements on 1750 M, and enclosed this photo of the antenna and a gin pole assembly. Keith has spent some time in the hospital, so antenna progress has been slow this summer.

Boyd Skillin (B, Fresno) notes that MedFERS might be interested in an article on simple active antennas for AM band receivers in Popular Electronics, July, 1989. This issue also features an article on building a whistler receiver. Boyd picked up the RAK-8 receiver donated by experimenter **Jim Gordon** of Saratoga. Boyd says, "My top priority right now is to replace **B** with **MGX** for the beacon. To paraphrase a bumpersticker, ...'so many projects, so little time'." Amen!

Ed Gelinas (T, Sunnyvale) says in a letter dated June 21, "I am writing this from Frank Raines Park (in the mountains 40 miles east of San Jose, CA). I copied the medium frequency beacons **TI, Z2, and D** last night between 10:30 and 10:50 P.M. PDT. Copied each ident consistently over a five minute period. These beacons really do get out, and these guys deserve credit for their efforts. Receiving setup here is a Shack DX-160 with a line tuner. Antenna is a 'T' that is 150 feet long and 25 feet high.

Herb Vanderbeek (G, V) reports that a friend, **Jim Pelmulder** (N6PTM) is hearing **EK, PRK and V** using a pre-WW2 HRO connected to a longwire. Jim is two miles north of Sebastapol, CA, some 85 miles to **EK** and 90 miles to **PRK**. Herb notes that the **V** QTH is being sold and Jim has agreed to board **V** for awhile. This will be an entirely new antenna system, in the clear rather than between trees and slight valley as now. (Ed. note: lousy antenna or not, I am hearing **V** quite well here in Sunnyvale at 85 miles).

Bob Cutter (CO, Colorado) checked in to say, "I have pulled my beacon down for the summer". Bob also reports confident copy of the **Ed Gelinas** MedFER beacon **T** at 0224 Z on 20 March 89.

Sam Rappold (ZYK, Redway, CA) says his LowFER beacon is generating local reports, but he asks those farther away to listen.

A new mystery beacon appeared on 182.04 kHz sending **ZI** the first week of July. With the help of **Mitchell Lee** in San Jose we DF's the beacon and subsequently talked to its owner, **Frank Butscher** W6SZS of San Jose. Frank is using a spare beacon loaned by **PRK** in Saratoga. His antenna is a vertical with

a single tophat wire. His ident will probably change soon to **SZS**. Welcome to the band, Frank!

Dave Bradley (W6CUB) bought a new MSC switched capacitor filter at Dayton this year. Since his station isn't set up at the moment, he may send it to **Mike Mideke** for evaluation. Anybody else have experience with this filter?

Ron Barlow (N4GJV of North Carolina) writes, "As of May 22 I have a 100 mW MedFER beacon in operation on 1631.54 kHz using the letter **A** as the identifier. An electrical storm has already zapped it off the air once, but for the present it is QRV 24h/7d. Unfortunately, the antenna is surrounded by dense tree growth, but I have copied its groundwave signal about 14 miles away at my place of work using only a BFO-equipped auto radio. I also am copying the **30HH** MF beacon in Western Pennsylvania using the same radio and a short hank of wire as the antenna."

Arliss Thompson (XU) of South Dakota wrote us with his new address and commented, "Not much LF news from here. **XU** has been off the air since an ice storm destroyed the antenna tophat earlier this year. It will be back on the air soon at my new QTH. QTH is a farmhouse, quiet location, lots of room."

Cliff Buttschardt (C, Morro Bay) inelegantly reported that **C** was down for a few days due to low battery voltage. Diagnosis --- bird poo on the solar panel! Clean up your act, Clifford!

Thanks to **Randy Seden (ELU)** for writing the article about 1750m AMTOR which appears in this issue. The LA guys are really having good luck with this mode!

Mike Mideke (Z2) reported on a personal communication he received recently from **Dr. J.P. Harrington**, an astronomer in Maryland. The subject was information concerning a Soviet space satellite mission scheduled for later this year which will carry a high-power (10 kW) VLF transmitter! This transmitter reportedly will send pulses at a carrier frequency of about 9.6 kHz. Mike is in correspondence with Dr. Harrington, and perhaps we'll hear more on this later.

Jim Weiss of Illinois sent construction details and a kit of parts for me to re-create his successful LF loop antenna. I'm looking forward to the project, but it is going to have to wait a bit while we sort out the summer priorities. Thanks Jim!

That's about it for this issue! Remember, I need your inputs (what you're doing, photos, schematics, wild hare-brained ideas, whatever) in order to keep the WU the informative vehicle it is intended to be.

73, and good experimenting!

Jim Ericson

WESTERN UPDATE ACTIVE LIST as of July 16, 1989

Anderson	Brice	BA	W9PNE	PO Box 14	Lancaster	IL	62855	(618)299-2441
Armstrong	Lloyd			3813 Lancaster Drive	Pueblo	CO	81005-3065	
Babcock	David		WA6EBH	2940 Cheyenne Road	Riverside	CA	92506	
Bahr	Leland	LEE	W0VT	914 Golden Bear Lane	Kingwood	TX	77339-2914	(713)359-5284
Baker	Brad			21024 Bear Creek Road	Los Gatos	CA	95030	
Balfour	Herb	OHH	VE3OHH	91 Elgin Mills Road West	Richmond Hill (Canada)	ONT	L4C4M1	(416)884-5355
Barlow	Ron		N4GJV	Route 1, Box 297	Cleveland	NC	27013	
Bauer	Frank	FB	W6FPO	PO Box 1086	Felton	CA	95018	(408)335-7392
Bittner	Mike			27215 Sunnyridge Road	Palos Verdes	CA	90274	
Bond	Robert		WD6BCN	1420 McLoughlin Avenue	Oxnard	CA	93035	(805)985-0159
Borglum	James			5549 Lesa Road	La Mesa	CA	92041	(619)464-3250
Bowers	William			11542 South Kirkwood	Stafford	TX	77477	(713)530-4364
Bradley	Dave		W6CUB	PO Box 2043	Freedom	CA	95019-2043	
Bumpus	Carle			930 Idylberry Road	San Rafael	CA	94903	
Burhens	Ralph			161 Grosvenor Street	Athens	OH	45701	(614)593-8207
Buttschardt	Cliff	HDOMBAY, C	W6HDO	950 Pacific Street	Morro Bay	CA	93442-2327	(805)772-2132
Carter	Max	MAX		46 - 14th Street	Wheatland	WY	82201	(307)322-9439
Cathell	Frank	H,D,H2	K3YAZ	PO Box 535	Descanso	CA	92016	(619)445-8167
Chalmers	Doug			450 Adobe Place	Palo Alto	CA	94306	
Chaplin	Carl		W7QO	Box 2800	Minden	NV	89423	
Chappell	Vernon			4511 - 36th Street #6	San Diego	CA	92116	
Coote	James	J	WB6AAM	808 North Ave. 66	Los Angeles	CA	90042	(213)258-7490
Cornell	Ken		W2IMB	225 Baltimore Avenue	Pt. Pleasant Beach	NJ	08742	
Costa	Bob		KB6QXM	P.O. Box 600	Redwood Estates	CA	95044	(408)353-3656
Cripe	David			7908 Wellesley Court	Pasadena	MD	21122	
Curry	David	PLI	WD4PLI	852 N. Lima Street	Burbank	CA	91505	(818)846-0617
Cutter	Robert	CO	KI0G	701 19th Street	Glenwood Springs	CO	81601	
DeVaughn	Bob	NBD	K3NBD	829 Estella Street	Pittsburgh	PA	15210	(412)488-1479
Dorman	Mike			15635 21st Ave. SW	Seattle	WA	98166	(206)246-3796
Ericson	Jim	EK	KG6EK	226 Charles Street	Sunnyvale	CA	94086-6063	(408)773-8947
Farkas	Greg	AZ	AK7Y	PO Box 17074	Tucson	AZ	85731-7074	(602)749-4796
Farnsworth	Charles			506 Rutledge Drive	Lodi	CA	95240	
Faulkner	Charles	FPV	W6FPY	15844 McKeever	Granada Hills	CA	91344	(818)366-6210
Fisher	Montie		WA5TSL	808 Brett Drive	Edmond	OK	73013	
Forsman	Stan			1312 Burrows Road	Campbell	CA	95008	(408)374-2129
Fornek	Stan		K9IXC	640A Rance Road	Oswego	IL	60543	
Gelinas	Ed	T(dashes)	WA6AJY	557 N. Bayview	Sunnyvale	CA	94086	
Gosenca	Michael			203 Cherry St.	Eaton Rapids	MI	48827	
Hedspeth	Scott	N3S	WB4YZA	Route 4, Box 146	Mocksville	NC	27028	(704)284-4021
Helms	Bernard			4210-1 Walnut	Berrien Springs	MI	49103	
Holland	David	DCH	K3YAY	300 South Main Street	Berlin	MD	21811	
Hooper	William		KF6AR	366 S. El Monte Road	Los Altos	CA	94022	
Hoopes	John			1084-B Sergeants Drive	Robins AFB	GA	31098	
Horton	Bob	MSG	W6MSG	2 Fresno Street	Paso Robles	CA	93446	(805)238-2250
Humphrey	Lee		WD5BTU	Rt. 2, Box 449	Jasper	TX	75951	(409)384-9489
Isbell	Daryl		KB5EDW	Box 2146 C.S.	Socorro	NM	87801	(505)835-1395
Johnson	Dave			PO Box 389	Gainesville	FL	32602	
Johnson	Dave	F		713 Texas Ave.	Los Banos	CA	93635	(209)826-0841
Johnson	David		WB7ACG	PO Box 15646	Rochester	NY	14615-0646	(716)235-1104
Johnson	Don	AU	W9TIF	3304 Roxford	Champaign	IL	61821	(217)398-4020
Jones	Ron		K7RJ	9241 S. Toni Lee Circle	West Jordan	UT	84088	(801)561-2685
Jones	Wallie	WJ	W6SZQ	9090 Nagle Ave.	Arleta	CA	91331	(818)892-0552
Kassel	Charles			114 Church Drive	Mastic Beach	NY	11951	
Keeley	Roy		KC4IMC	Route 3, Box 316 Salt Air Rd	Theodore	AL	36582	(205)973-2516
Keller	Eb			2984 Fallwood Lane	San Jose	CA	95132	(408)263-6229
Kincaid	Nilan		W6EIG	5529 W. 140th Street	Hawthorne	CA	90250	(213)643-5269
Knight	David			4240 Fay Road	Syracuse	NY	13219	
Kraus	Howard	K2UD		372 Callodine Avenue	Amherst	NY	14226	
LaGrua	Michael			Box 549	Caspran	MI	49915-0549	

Layer	Hal		N6SPD	PO Box 27676	San Francisco	CA	94127	(415)661-6958
Lee	Mitchell	MEL	KB6FPW	172 North 24th Street	San Jose	CA	95116	(408)298-3026
Lehrbaum	Rick		AC11	3275 Stockton Place	Palo Alto	CA	94303	
Leonardelli	John		VE3IPS	Box 722, Station A	Downsview (Canada)	ONT	M3M3A9	(416)636-3300
Lingwall	J.			PO 70, 1025 Trinidad	Calhan	CO	80808	
Mallory	Mark	MPM	WB7CAK	5196 Cobblecreek Road #7K	Salt Lake City	UT	84117	
Manley	Dean		KH6B	2058 Ainaola Drive	Hilo	HI	96720-3638	(808)959-8257
Marshall	Dave			440 Larry Drive	Florissant	MO	63033	
Martin	Steve		NK3R	141 Bridgecreek Drive	Goose Creek	SC	29445	(803)797-3143
Mawhinney	Scott	T (dashes)		295 Pettis Avenue	Mountain View	CA	94041	(415)960-1041
Maxwell	James		W6CF	PO Box 473	Redwood Estates	CA	95044	(408)353-2094
McGreevy	Steve	SS, SA, TLX	N6NKS	45 Elda Drive	San Rafael	CA	94903-3723	(415)479-4259
Mideke	Mike	Z2	WB6EER	Box 123	San Simeon	CA	93452	
Morgan	Robert		KA0FTA	2817 West St. Anne	Rapid City	SD	57702	
Mussler	Mike			Bonanza Star Route	Nederland	CO	80466	
Nickerson	Rick	R	KB6JQU	3224 Saxonville Way	Sacramento	CA	95842	(916)348-1466
Olson	Keith	7FS	W7FS	E 15470 Highway 106	Belfair	WA	98528	(206)275-2560
Osterud	Jim			519 Capri Circle	Tooele	UT	84074	
Otacilio P. de Sousa	Jose'			Rua Calisto 62, Recanto dos Vinhais	Sao Luis, MA, Brasil, PR8BNP		65070	
Owens	James	Q	NW00	1363 Tipperary	Boulder	CO	80303	
Paschal	Ev			Sinclair Island	Anacortes	WA	98221	(206)293-8176
Pelmulder	Jim		N6PTM	2801 Gravenstein Highway	Sebastopol	CA	95472	
Pepe	Bill		WA2TDR	Box 1915	Bloomfield	NJ	07003	
Peterson	Art			851 31st Street	Richmond	CA	94804	(415)234-2014
Phillips	Ed	IZJ	W6IZJ	408 North Alabama Street	San Gabriel	CA	91775	(818)285-8308
Pomer	Zvi		4X1KT	5703 Caminito Norte	LaJolla	CA	92037	
Pomplun	Don		K2BIO	521 Van Buren Place	San Ramon	CA	94583	(415)829-7648
Post	Kendall			1842 Hoffman Street	Madison	WI	53704	(608)244-0500
Raney	David	UPN	WC8E	4128 Linden Avenue	Cincinnati	OH	45236	(513)791-0740
Rappold	Sam	ZYK	WB6ZYK	PO 1267/479 Briceland Road	Redway	CA	95560	
Ratzlaff	Steve	SR	AA7U	900 Henderson / 60A	Sunnyvale	CA	94086-9059	(408)248-0343
Raven	Gregory	TEXAS	KF5N	4550 Sunnybank Court	Fort Worth	TX	76137	(817)485-6771
Reid	Frank		W9MKV	Box 5283	Bloomington	IN	47407-5283	
Remington	Sheldon	HO	NI6E	PO Box 2094	Pahoa	HI	96778	
Roberts	Todd	ABC	WD4NGG	PO Box 21413	Hilton Head Island	SC	29925	(803)681-8114
Satterthwaite	Ed			4189 Willmar Drive	Palo Alto	CA	94306	
Schick	D.H			580 N. Buena Vista Dr.	Lake Alfred	FL	33850	
Seabury	Tom			PO 535	Diablo	CO	94528	
Seamons	John	JKS	KF6VO	95 Holstein Road	San Anselmo	CA	94960	(415)456-6090
Seden	Randy	ELU	WD6ELU	1272 Harold Avenue	Simi Valley	CA	93065	(805)583-5687
Sethman	Bob			92 Allen Plan	Donora	PA	15033	
Skillin	Boyd	B	K6MGX	3876 East Pico	Fresno	CA	93726	(209)222-0275
Smith	Glen		N6CX	220 Laurel, POB 475	Kenwood	CA	95452	
Smith	Randy			19515 Frederick Rd. #135	Germantown	MD	20874	
Snow	John		N6AMZ	3708 Judah Street	San Francisco	CA	94122-1227	
Spaulding	Fred		K1YQP	883 San Simeon Drive	Mountain View	CA	94043	(415)961-5018
Spencer	Chris	FAW	WB7FAW	722 West 1850th North	Orem	UT	84057	(801)225-7852
Statom	Mike			1604 S. Campbell Avenue	Alhambra	CA	91803	(818)289-7170
Stewart	Don			2617 Anza Street	Bakersfield	CA	93305-3109	(805)871-7024
Stinson	Dave	R, NTS	AB5S/7	3550 Paradise #740	Las Vegas	NV	89109	(702)732-4069
Sullivan	John			2069 Touraine Lane	Half Moon Bay	CA	94019	
Taylor	Al			112 Cook Road	Whitehorn	CA	95489	(707)986-7775
Thompson	Arliss	XU	W7XU	Route 1, Box 52	Colton	SD	57018	(605)446-3687
Turner	Clint	CT	KA7OEI	145 West Street	Pleasant Gap	PA	16823	(814)359-2663
Vanderbeek	Herb	G, V, 8-dits	WY6G	630 Ashton Avenue	Palo Alto	CA	94306	(415)493-1726
Vandermaaten	Jim	SM	WB6QZL	1276 Tourney Drive	San Jose	CA	95131	(408)258-6872
Waldsmith	Gary	SUK	K4SUK	1441 Hound Hollow Road	Pilot Hill	CA	95664	(916)933-3815
Weiss	Jim		W9ZMY	c/o Radio WTAQ	LaGrange	IL	60525	(312)579-9104
Welch	James		KK6N	3071 Mauricia Avenue	Santa Clara	CA	95051	
Wilson	Rex	TI	KB7TI	4550 Vernetti Lane	Kingman	AZ	86401	(602)757-3649
Wright	Rick	ISUN	KA5YWH	Box 4181, Station A, SEOSU	Durant	OK	74701	(405)924-3699
Wyatt	Frank		N6FW	855 Ticonderoga Drive	Sunnyvale	CA	94087	(408)737-8155